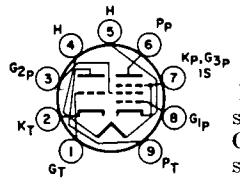


9LZ

HIGH-MU TRIODE—SHARP-CUTOFF PENTODE

6GW8/ ECL86

Miniature type used in preamplifier and audio output stages of audio equipment and television receivers. **Outlines section,** 6G; requires miniature 9-contact socket. **Heater:** volts (ac/dc), 6.3; amperes, 0.7; maximum heater-cathode volts, 100 peak.

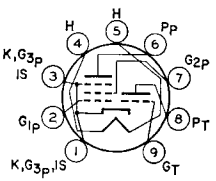
Class A_1 Amplifier

MAXIMUM RATINGS (Design-Center Values)	Triode Unit	Pentode Unit	
Plate Supply Voltage	550	550	volts
Plate Voltage	300	300	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	550	volts
Grid-No.2 Voltage	—	300	volts
Grid-No.1 (Control-Grid) Voltage, Negative-bias value	1.3	1.3	volts
Cathode Current	4	55	mA
Plate Dissipation	0.5	9	watts
Grid-No.2 Input	—	1.5	watts
CHARACTERISTICS			
Plate Voltage	250	250	volts
Grid-No.2 Voltage	—	250	volts
Grid-No.1 Voltage	—1.9	—7	volts
Amplification Factor	100	21*	
Plate Resistance (Approx.)	—	45000	ohms
Transconductance	1600	10000	μmhos
Plate Current	1.2	36	mA
Grid-No.2 Current	—	6	mA
MAXIMUM CIRCUIT VALUES			
Grid-No.1-Circuit Resistance, for fixed-bias operation	1	0.5	megohm

* Grid No.2 to grid No.1.

Refer to chart at end of section.
For replacement use type 6GY6/6GX6.

6GX6



9QA

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

6GX7

Miniature type used as combined oscillator-mixer tube in vhf tuner circuits of color and black-and-white television receivers. **Outlines section,** 6B; requires miniature 9-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.4	ampere
Heater-Cathode Voltage:		
Peak value	±200 max	volts
Average value	100 max	volts
Direct Interelectrode Capacitances:**		
Triode Unit:		
Grid to Plate	1.2	pF
Grid to Cathode, Heater, Pentode Cathode, Grid No.3, and Internal Shield	2.3	pF
Plate to Cathode, Heater, Pentode Cathode, Grid No.3, and Internal Shield	1.9	pF
Pentode Unit:		
Grid No.1 to Plate	0.005	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	5.4	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	3.3	pF
Grid No.1 to Grid No.2	1.6	pF

** With external shield connected to cathode.

Class A_1 Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	275	275	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	275	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage:			
Positive-bias value	0	0	
Negative-bias value	40	40	volts
Cathode Current	20	20	mA
Plate Dissipation	1.5	2.2	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 137.5 volts	—	0.45	watts
For grid-No.2 voltages between 137.5 and 275 volts	—	See curve page 300	

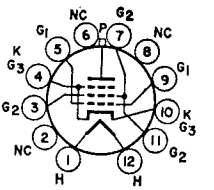
CHARACTERISTICS	Triode Unit		Pentode Unit		
Plate Voltage	100	125	120	125	volts
Grid-No.2 Voltage	—	—	90	125	volts
Grid-No.1 Voltage	—	—1	—	—1	volt
Grid-No.1-Circuit Resistance	0.1	—	0.1	—	megohm
Amplification Factor	40	—	—	—	
Plate Resistance	—	4700	—	200000	ohms
Transconductance	8700	8500	13000	11000	μmhos
Plate Current	12.5	13	8.5	8	mA
Grid-No.2 Current	—	—	2.8	2.5	mA
Grid-No.1 Voltage for plate current of 20 μA	—6	—	—2.5	—	volts

MAXIMUM CIRCUIT VALUES	Triode Unit	Pentode Unit	
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.5	0.25	megohm
For cathode-bias operation	1	0.5	megohm

6GY5

16GY5, 21GY5

BEAM POWER TUBE



12DR

Duodecar type used as horizontal-deflection amplifier in television receivers. **Outlines section,** 39A; requires duodecar 12-contact socket. Types 16GY5 and 21GY5 are identical with type 6GY5 except for heater ratings.

	6GY5	16GY5	21GY5	
Heater Voltage (ac/dc)	6.3	15.8	21	volts
Heater Current	1.5	0.6	0.45	amperes
Heater Warm-up Time (Average)	—	11	11	seconds
Heater-Cathode Voltage:				
Peak value	±200 max	±200 max	±200 max	volts
Average value	100 max	100 max	100 max	volts

Class A_1 Amplifier

CHARACTERISTICS	Pentode Connection			Triode† Connection	
Plate Voltage	5000	60	130	130	volts
Grid-No.2 (Screen-Grid) Voltage	130	130	130	130	volts
Grid-No.1 (Control-Grid) Voltage	—	0	—20	—20	volts
Amplification Factor	—	—	—	4.7	
Plate Resistance (Approx.)	—	—	11000	—	ohms
Transconductance	—	—	9100	—	μmhos
Plate Current	—	410**	50	—	mA
Grid-No.2 Current	—	24**	1.75	—	mA
Grid-No.1 Voltage (Approx.) for plate current of 1 μA	—66	—	—33	—	volts

** This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

† Grid No.2 tied to plate.

Horizontal-Deflection Amplifier

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)		
DC Plate Supply Voltage	770	volts
Peak Positive-Pulse Plate Voltage#	6500	volts

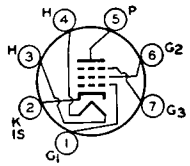
Peak Negative-Pulse Plate Voltage	1500	volts
DC Grid-No.2 Voltage	220	volts
DC Grid-No.1 Voltage	—55	volts
Peak Negative-Pulse Grid-No.1 Voltage	330	volts
Peak Cathode Current	800	mA
Average Cathode Current	230	mA
Plate Dissipation††	18	watts
Grid-No.2 Input	3.5	watts
Bulb Temperature (At hottest point)	220	°C

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance	1	megohm

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).
†† A bias resistor or other means is required to protect the tube in absence of excitation.

6GY6
6GY6/ 6GX6



7EN

SHARP-CUTOFF PENTODE

Miniature type used in gated-agc-amplifier circuits and as a noise-inverter tube in color and black-and-white television receivers. Tube has two independent control grids. **Outlines section,** 5C; requires miniature 7-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.45	ampere
Heater Warm-up Time (Average)	11	seconds
Heater-Cathode Voltage:		
Peak value	±200 max	volts
Average value	100 max	volts
Direct Interelectrode Capacitances:		
Grid No.1 to Plate	0.026	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	8	pF
Grid No.1 to Grid No.3	0.12	pF
Grid No.3 to Plate	1.6	pF
Grid No.3 to Cathode, Heater, Plate, Grid No.1, Grid No.2, and Internal Shield	6.5	pF

Class A_1 Amplifier

CHARACTERISTICS

Plate Supply Voltage	150	volts
Grid-No.3 Supply Voltage	0	volts
Grid-No.2 Supply Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts
Cathode-Bias Resistor	180	ohms
Plate Resistance (Approx.)	0.14	megohm
Transconductance, Grid No.1 to Plate	3700	μmhos
Transconductance, Grid No.3 to Plate	750	μmhos
Plate Current	3.7	mA
Grid-No.2 Current	3	mA
Grid-No.3 Supply Voltage (Approx.) for plate current of 20 μA	—7	volts
Grid-No.1 Supply Voltage (Approx.) for plate current of 20 μA	—4.5	volts

Gated AGC Amplifier and Noise Inverter

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	300	volts
Peak Positive-Pulse Plate Voltage#	600	volts
Grid-No.3 (Control-Grid) Voltage:		
Negative-bias value	100	volts
Positive-bias value	0	volts
Grid-No.2 (Screen-Grid) Supply Voltage	300	volts
Grid-No.2 Voltage	See curve page 300	
Grid-No.1 (Control-Grid) Voltage:		
Negative-bias value	50	volts
Positive-bias value	0	volts
Plate Dissipation	1.7	watts
Grid-No.2 Input:		
For grid-No.2 voltages up to 150 volts	1	watt
For grid-No.2 voltages between 150 and 300 volts	See curve page 300	

Screen-Grid (Grid-No. 2) Input Rating Chart

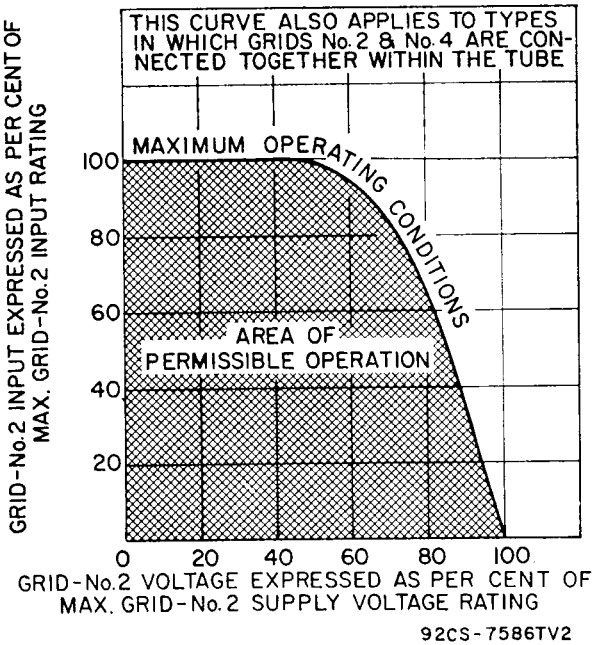


Fig. 134—Grid-No.2 input rating curve.

For certain voltage amplifier types, as listed in the data section, the maximum permissible screen-grid (grid-No. 2) input varies with the screen-grid voltage, as shown in the chart above. (This chart cannot be assumed to apply to types other than those for which it is specified in the data section.) Full rated screen-grid input is permissible at screen-grid voltages up to 50 per cent of the maximum rated screen-grid supply voltage. From the 50-per-cent point to the full rated value of supply voltage, the screen-grid input must be decreased. The decrease in allowable screen-grid input follows a curve of the parabolic form. This rating chart is useful for applications utilizing either a fixed screen-grid voltage or a series screen-grid voltage-dropping resistor. When a fixed voltage is used, it is necessary only to determine that the screen-grid input is within the boundary of the operating area on the chart at the selected value of screen-grid voltage to be used. When a voltage-dropping resistor is used, the minimum value of resistor that will assure tube operation within the boundary of the curve can be determined from the following relation:

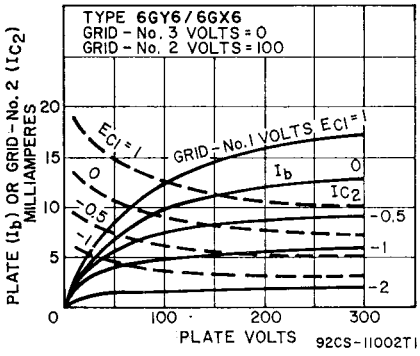
$$R_{g2} \geqq \frac{E_{c2}\ (E_{cc2}-E_{c2})}{P_{c2}}$$

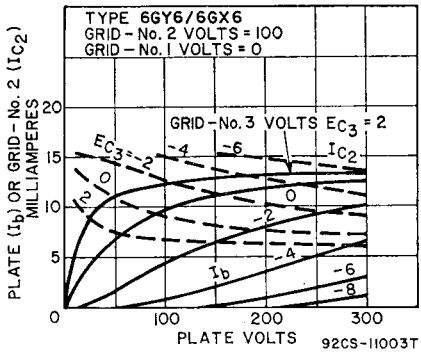
where R_{g2} is the minimum value for the voltage-dropping resistor in ohms, E_{c2} is the selected screen-grid voltage in volts, E_{cc2} is the screen-grid supply voltage in volts, and P_{c2} is the screen-grid input in watts corresponding to E_{c2}.

MAXIMUM CIRCUIT VALUES

Grid-No.3-Circuit Resistance	0.68	megohm
Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.22	megohm
For cathode-bias operation	0.47	megohm

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).





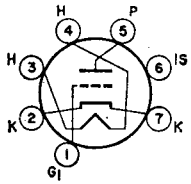
Refer to chart at end of section. **6GY8**

Refer to chart at end of section. **6GZ5**

Refer to chart at end of section. **6H6**

Refer to chart at end of section. **6H6GT**

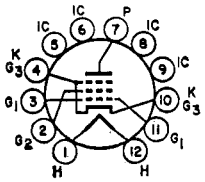
For replacement use type 6HM5/6HA5. **6HA5**



HIGH-MU TRIODE — 6HA5-S

Miniature type used as rf-amplifier tube in vhf television tuners. **Outlines section,** 5B; requires miniature 7-contact socket. Type 6HA5-S is electrically identical with type 6HM5/6HA5.

For replacement use type 6HB6/6HA6. **6HA6**



BEAM POWER TUBE — 6HB5

Duodecar type used as horizontal-deflection amplifier in television receivers. **Outlines section,** 15B; requires duodecar 12-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	1.5	amperes
Heater-Cathode Voltage:		
Peak value	±200 max	volts
Average value	100 max	volts

Class A_1 Amplifier

CHARACTERISTICS	Pentode Connection			Triode* Connection	
Plate Voltage	5000	60	130	130	volts
Grid-No.2 (Screen-Grid) Voltage	130	130	130	130	volts
Grid-No.1 (Control-Grid) Voltage	—	0	—20	—20	volts
Amplification Factor	—	—	—	4.7	
Plate Resistance (Approx.)	—	—	11000	—	ohms
Transconductance	—	—	9100	—	μmhos
Plate Current	—	410▪	50	—	mA
Grid-No.2 Current	—	24▪	1.75	—	mA
Grid-No.1 Voltage (Approx.) for plate current of 1 mA	—66	—	—33	—	volts

* Grid No.2 tied to plate.

▪ This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

Horizontal-Deflection Amplifier

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)		
DC Plate Supply Voltage	770	volts
Peak Positive-Pulse Plate Voltage#	6000	volts
Peak Negative-Pulse Plate Voltage	1500	volts
DC Grid-No.2 Voltage	220	volts
DC Grid-No.1 Voltage	—55	volts
Peak Negative-Pulse Grid-No.1 Voltage	330	volts
Peak Cathode Current	800	mA
Average Cathode Current	230	mA
Plate Dissipation†	18	watts
Grid-No.2 Input	3.5	watts
Bulb Temperature (At hottest point)	220	°C
MAXIMUM CIRCUIT VALUE		
Grid-No.1-Circuit Resistance	1	megohm

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).

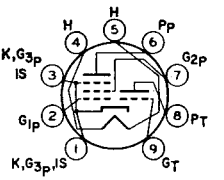
† A bias resistor or other means is required to protect the tube in absence of excitation.

6HB6
6HB6/6HA6

Refer to chart at end of section.

6HB7
5HB7

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE



Miniature type used as combined oscillator and mixer tube in color and black-and-white television receivers utilizing an intermediate frequency in the order of 40 MHz. **Outlines section,** 6B; requires miniature 9-contact socket. Type 5HB7 is identical with type 6HB7 except for heater ratings.

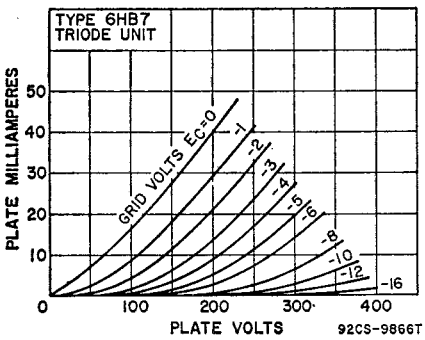
	5HB7	6HB7	
Heater Voltage (ac/dc)	4.7	6.3	volts
Heater Current	0.6	0.45	ampere
Heater Warm-up Time (Average)	11	11	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts
Direct Interelectrode Capacitances:△			
Triode Unit:			
Grid to Plate		1.9	pF
Grid to Cathode, Heater, Pentode Grid No.3, and Internal Shield		3	pF
Plate to Cathode, Heater, Pentode Grid No.3, and Internal Shield		1.9	pF
Pentode Unit:			
Grid No.1 to Plate		0.010 max	pF
Grid No 1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		3.4	pF
Heater to Cathode▪		3.8	pF

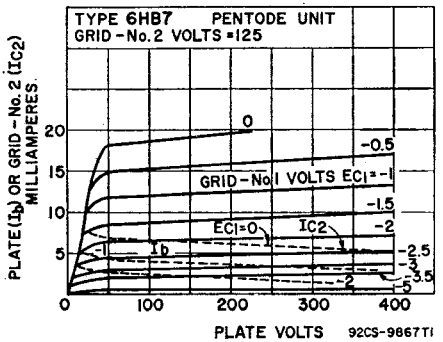
△ With external shield connected to cathode except as noted.

▪ With external shield connected to ground.

Class A_1 Amplifier

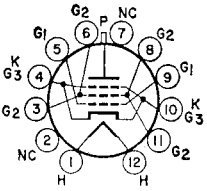
MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	330	330	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	330	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage:			
Positive-bias value	0	0	volts
Plate Dissipation	2.5	3.1	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 165 volts	—	0.55	watt
For grid-No.2 voltages between 165 and 330 volts	—	See curve page 300	
CHARACTERISTICS			
Plate Supply Voltage	150	125	volts
Grid-No.2 Supply Voltage	—	125	volts
Grid-No.1 Supply Voltage	0	—1	volts
Cathode-Bias Resistor	56	—	ohms
Amplification Factor	40	—	
Plate Resistance (Approx.)	0.005	0.2	megohm
Transconductance	8500	6400	μmhos
Plate Current	18	12	mA
Grid-No.2 Current	—	4	mA
Grid-No.1 Voltage (Approx.) for plate current of 10 μA	—12	—9	volts
MAXIMUM CIRCUIT VALUES			
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.5	0.25	megohm
For cathode-bias operation	1	0.5	megohm





Refer to chart at end of section. **6HD7**

Refer to chart at end of section.
For replacement use type 6JB5/6HE5. **6HE5**



BEAM POWER TUBE **6HF5**

Duodecar type used as horizontal-deflection amplifier in color and black-and-white television receivers. **Outlines section,** 16B; requires duodecar 12-contact socket. **Heater:** volts (ac/dc), 6.3; amperes, 2.25; maximum heater-cathode volts, ±200 peak, 100 average.

Class A_1 Amplifier

CHARACTERISTICS	Pentode Connection			Triode* Connection	
Plate Voltage	5000	70	175	125	volts
Grid-No.2 (Screen-Grid) Voltage	125	125	125	125	volts
Grid-No.1 (Control-Grid) Voltage	—	0	—25	—25	volts
Amplification Factor	—	—	—	3	
Plate Resistance (Approx.)	—	—	5600	—	ohms
Transconductance	—	—	11300	—	μmhos
Plate Current	—	570▪	125	—	mA
Grid-No.2 Current	—	34▪	4.5	—	mA
Grid-No.1 Voltage (Approx.) for plate current of 1 mA	—140	—	—54	—	volts

* Grid No.2 tied to plate.

▪ This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

Horizontal-Deflection Amplifier

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)		
DC Plate Supply Voltage	900	volts
Peak Positive-Pulse Plate Voltage# (Absolute Maximum)	7500▲	volts
Peak Negative-Pulse Plate Voltage	1100	volts
DC Grid-No.2 Voltage	190	volts
Peak Negative-Pulse Grid-No.1 Voltage	250	volts
Peak Cathode Current	1100	mA
Average Cathode Current	315	mA
Plate Dissipation†	28	watts
Grid-No.2 Input	5.5	watts
Bulb Temperature (At hottest point)	225	°C
MAXIMUM CIRCUIT VALUE		
Grid-No.1-Circuit Resistance	1	megohm

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).

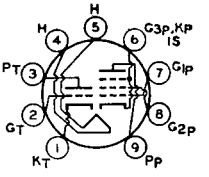
▲ Under no circumstances should this absolute value be exceeded.

† A bias resistor or other means is required to protect the tube in absence of excitation.

6HF8

10HF8

HIGH-MU TRIODE— SHARP-CUTOFF PENTODE



9DX

Miniature type used in color and black-and-white television receiver applications. The triode unit is used in high-gain, sound-if stages and in sync-separator, sync-clipper, and phase-inverter circuits; the pentode unit is used as a video-output amplifier. **Outlines section,** 6E; requires miniature 9-contact socket. For curves of average characteristics, refer to type 6AW8A for the triode unit and to type 6EB8 for the pentode unit. Type 10HF8 is identical with type 6HF8 except for heater ratings.

	6HF8	10HF8	
Heater Voltage (ac/dc)	6.3	10.5	volts
Heater Current	0.75	0.45	ampere
Heater Warm-up Time (Average)	—	11	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts
Direct Interelectrode Capacitances:			
Triode Unit:			
Grid to Plate		3.5	pF
Grid to Cathode, Heater, Pentode Cathode, Grid No.3, and Internal Shield		2.8	pF
Plate to Cathode, Heater, Pentode Cathode, Grid No.3, and Internal Shield		2.6	pF
Pentode Unit:			
Grid No.1 to Plate		0.1 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		10	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		4.2	pF
Triode Grid to Pentode Plate		0.015 max	pF

Class A_1 Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	330	330	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	330	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Plate Dissipation	1	5	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 165 volts	—	1.1	watts
For grid-No.2 voltages between 165 and 330 volts	—	See curve page 300	

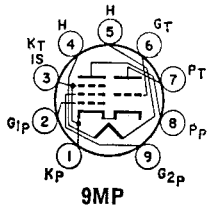
CHARACTERISTICS	Triode Unit	Pentode Unit		
Plate Supply Voltage	200	45	200	volts
Grid-No.2 Supply Voltage	—	125	125	volts
Grid-No.1 Voltage	—2	0	—	volts
Cathode-Bias Resistor	—	—	68	ohms
Amplification Factor	70	—	—	
Plate Resistance (Approx.)	17500	—	75000	ohms
Transconductance	4000	—	12500	μmhos
Plate Current	4	40•	25	mA
Grid-No.2 Current	—	15•	7	mA
Grid-No.1 Voltage (Approx.) for plate current of 100 μA	—	—	—9	volts
Grid-No.1 Voltage (Approx.) for plate current of 20 μA	—6	—	—	volts

MAXIMUM CIRCUIT VALUES	Triode Unit	Pentode Unit	
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.5	0.25	megohm
For cathode-bias operation	1	1	megohm

• This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

Refer to chart at end of section. **6HG5**

Refer to chart at end of section. **6HG8**



9MP

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

6HG8/ ECF86

5HG8/LCF86
7HG8/PCF86

Miniature type with frame-grid pentode unit used as combined oscillator and mixer tubes in vhf color and black-and-white television receivers. **Outlines section,** 6B; requires miniature 9-contact socket. Types 5HG8/LCF86 and 7HG8/PCF86 are identical with type 6HG8/ECF86 except for heater ratings.

	5HG8/ LCF86	6HG8/ ECF86	7HG8/ PCF86	
Heater Voltage (ac/dc)	5.3	6.3	7.2	volts
Heater Current	0.45	0.34	0.3	ampere
Heater Warm-up Time (Average)	11	—	—	seconds
Peak Heater-Cathode Voltage	±100 max	±100 max	±100 max	volts

Class A_1 Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	125	250	volts
Grid-No.2 (Screen-Grid) Voltage	—	150	volts
Cathode Current	15	18	mA
Plate Dissipation	1.5	2	watts
Grid-No.2 Input	—	0.5	watt

CHARACTERISTICS			
Plate Voltage	100	170	volts
Grid-No.2 Voltage	—	150	volts
Grid-No.1 (Control-Grid) Voltage	—3	—1.2	volts
Amplification Factor	17	—	

Mu-Factor, Grid No.2 to Grid No.1	—	70	
Plate Resistance (Approx.)	—	0.35	megohm
Transconductance	5500	12000	μmhos
Plate Current	14	10	mA
Grid-No.2 Current	—	3.3	mA
MAXIMUM CIRCUIT VALUES			
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	—	0.25	megohm
For cathode-bias operation	0.5	0.5	megohm

6HJ5 Refer to chart at end of section.

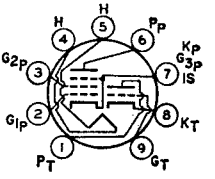
6HJ8 Refer to chart at end of section.

6HK5 Refer to chart at end of section.

6HL8

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

Miniature type used in color and black-and-white television receiver applications. The triode unit is used as a sync-separator or voltage-amplifier tube, and the pentode unit is used as a video if-amplifier, age-amplifier, or reactance tube. **Outlines section,** 6B; requires miniature 9-contact socket. **Heater:** volts (ac/dc), 6.3; amperes, 0.6; warm-up time (average), 11 seconds; maximum heater-cathode volts, ±200 peak, 100 average.



9AE

Class A_1 Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	330	330	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	330	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Plate Dissipation	2.5	2.5	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 165 volts	—	0.55	watt
For grid-No.2 voltages between 165 and 330 volts	—	See curve page 300	
CHARACTERISTICS			
Plate Voltage	125	125	volts
Grid-No.2 Voltage	—	125	volts
Grid-No.1 Voltage	—1	—1	volt
Amplification Factor	40	—	
Plate Resistance (Approx.)	5000	150000	ohms
Transconductance	7000	10000	μmhos
Plate Current	12.5	12	mA
Grid-No.2 Current	—	4.5	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μA	—	—7	volts
MAXIMUM CIRCUIT VALUE			
Grid-No.1-Circuit Resistance	1	—	megohm

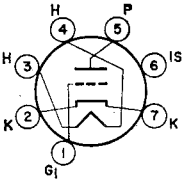
6HM5 For replacement use type 6HM5/6HA5.

6HM5/6HA5

2HM5/2HA5
3HM5/3HA5
4HM5/4HA5

HIGH-MU TRIODE

Miniature type used as rf-amplifier tube in vhf color and black-and-white television tuners. **Outlines section,** 5C; requires miniature 7-contact socket. Types 2HM5/2HA5, 3HM5/3HA5, and 4HM5/4HA5 are identical with type 6HM5/6HA5 except for heater ratings.



7GM

	2HM5/ 2HA5	3HM5/ 3HA5	4HM5/ 4HA5	6HM5/ 6HA5	
Heater Voltage (ac/dc)	2.0	2.7	4.0	6.3	volts
Heater Current	0.6	0.45	0.3	0.18	ampere
Peak Heater-Cathode Voltage	±110 max	±110 max	±110 max	±110 max	volts
Direct Interelectrode Capacitances:					
Grid to Plate				0.36	pF
Grid to Cathode, Heater, Internal Shield, and External Shield				4.3	pF
Plate to Cathode, Heater, Internal Shield, and External Shield				0.080	pF
Cathode to Plate				2.9	pF
Cathode to Heater, Grid, Internal Shield, and External Shield				3.1	pF
Heater to Cathode				2.3	pF
Heater to Grid				0.070 max	pF

Class A_1 Amplifier

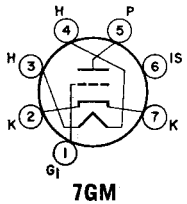
MAXIMUM RATINGS (Design-Maximum Values)

DC Plate Voltage	220	volts
DC Plate Supply Voltage	600	volts
Grid Voltage	—50	volts
Cathode Current	22	mA
Plate Dissipation	2.6	watts

CHARACTERISTICS AND TYPICAL OPERATION

	Fixed Bias		Cathode Bias		
DC Plate Supply Voltage	135	135	135	135	volts
Plate-Load Resistor	—	—	1000	5600	ohms
Internal-Shield Voltage	0	0	0	0	volts
DC Grid Voltage	—1	—2.7	—	—	volts
Cathode-Bias Resistor	—	—	0	87	ohms
Amplification Factor	72	—	80	72	
Transconductance	14500	1500	20000	14500	μmhos
Plate Current	11.5	—	19	11.5	mA
DC Grid Current	—	—	10	—	μA
Grid-No.1 Voltage for one-per-cent transconductance	—	—	—5.3	—8.1	volts

Refer to chart at end of section. **6HM6**



7GM

HIGH-MU TRIODE

6HQ5

2HQ5, 3HQ5, 4HQ5

Miniature type used as grounded-cathode rf-amplifier tube in vhf tuners of television receivers. **Outlines section, 5C;** requires miniature 7-contact socket. Types 2HQ5, 3HQ5, and 4HQ5 are identical with type 6HQ5 except for heater ratings.

	2HQ5	3HQ5	4HQ5	6HQ5	
Heater Voltage (ac/dc)	2.4	3	4.2	6.3	volts
Heater Current	0.6	0.45	0.3	0.2	ampere
Heater Warm-up Time (Average)	11	11	11	—	seconds
Peak Heater-Cathode Voltage	±100 max	±100 max	±100 max	±100 max	volts
Direct Interelectrode Capacitances (Approx.):*					
Grid to Plate				0.52	pF
Grid to Cathode, Heater, and Internal Shield				5	pF
Plate to Cathode, Heater, and Internal Shield				3.5	pF
Heater to Cathode				2.5	pF

* With external shield connected to cathode.

Class A_1 Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	200	volts
Grid Voltage, Negative-bias Value	50	volts
Cathode Current	22	mA
Plate Dissipation	2.5	watts

CHARACTERISTICS

Plate Voltage	135	volts
Grid Voltage	—1	volt
Amplification Factor	78	
Plate Resistance	5400	ohms
Transconductance	15000	μmhos
Plate Current	11.5	mA
Input Resistance**	275	ohms
Input Capacitance**	11.2	pF
Noise Figure#	4.7	dB
Grid Voltage (Approx.) for transconductance of 150 μmhos	—4.2	volts
Grid Voltage (Approx.) for transconductance of 1500 μmhos	—2.5	volts

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance, for cathode-bias operation	1	megohm

** Measured at 200 MHz with heater volts = 6.3 volts and plate effectively grounded for rf voltages.

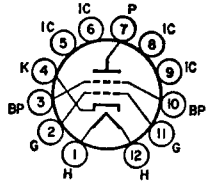
For a neutralized triode amplifier at a frequency of 200 MHz with signal source impedance adjusted for minimum noise output.

6HR5 Refer to chart at end of section.

6HR6 Refer to chart at end of section.

6HS5 BEAM TRIODE

Duodecar type used as a pulse-type regulator in the high-voltage power supply of color television receivers. **Outlines section,** 15F; requires duodecar 12-contact socket. **Heater:** volts (ac/dc), 6.3; amperes, 1.5.



12GY

Class A_1 Amplifier

CHARACTERISTICS

Pulse Plate Voltage*		3500	volts
Grid No.2 (Beam Plate)	Connected to	cathode at	socket
Grid-Voltage, Negative-bias value		4.4	volts
Peak Plate Current		300	mA
Amplification Factor		300	
Transconductance		65000	μmhos
Plate Resistance (Approx.)		4600	ohms
Grid Voltage (Approx.) for plate current of 1 mA		—13	volts

* Duty cycle of the pulse must be less than 2.5%.

High-Voltage Regulator Service

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)

Peak Plate Voltage#		5500	volts
Plate Dissipation		30	watts
Peak Plate Current		325	mA
Heater-Cathode Voltage:			
Peak value	+200	—450	volts
Average value		100	volts
Bulb Temperature (At hottest point)		220	°C

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance▲	0.1 megohm

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).
▲ Larger values of grid-circuit resistance may be used if provisions are made to protect the tube.